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ABSTRACT

Even Start is a federally funded program addressing the literacy needs of children and parents by offering parenting education, early childhood education, parent and child together time, and adult education. Noting that recent research on brain development and learning prompts a reexamination of beliefs and practices related to child rearing, teaching, and learning, this article provides information on brain development research and explores the implications for Even Start programs. The article discusses how brain development occurs through an interplay between nature and nurture, and notes the importance of critical periods for particular types of learning. The article maintains that negative experiences and the absence of appropriate stimulation are more likely to have serious and sustained effects during infancy than at later ages. The article further notes that how children are cared for has a decisive, long-lasting impact on their development, ability to learn, and capacity to regulate their own emotions. The following implications for Even Start programs are identified: (1) use parenting education as the vehicle for strengthening parent-child attachment; (2) use parenting education as the vehicle for developing children's literacy skills; and (3) provide opportunities for staff training and development in order to provide and maintain high-quality services. The article concludes by noting that Even Start practitioners have a unique opportunity to have a positive effect on improving the literacy, lives, and futures of many families. (KB)

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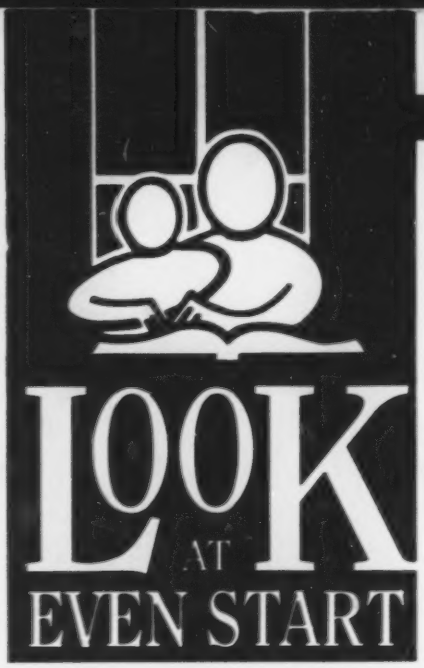

FALL 2000

Implications of Brain Development Research for Even Start Family Literacy Programs

By Mary Ellin Logue
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Even Start was founded on the belief that strengthening children's relationships with their parents and enriching their literacy environments would have a positive impact on children's learning and their performance in school and in life. When parents understand the connection between the ways they talk, play with and touch their young children and their children's growth and development, they can turn ordinary experiences into learning experiences. Even Start addresses the literacy needs of both children and parents by offering parenting education, early childhood education, parent and child together (PACT) time, and adult education, including English language instruction. This four-pronged approach is essential because, as scientists confirm and as wisdom and practice suggest, early experiences affect children's brain development and learning.

Concern about children entering school without the requisite skills or attitudes to learn has led many people to question whether today's children are different in some ways from the children of 20 or 30 years ago. There are indications that this may be true. Today, many children: eat more processed rather than natural foods; are exposed to environmental pollutants and hazards; are raised in single-parent households with fewer resources; have less opportunity for outdoor play because of safety concerns; are exposed to increased levels of violence, drugs and medications; and spend increased hours in front of television and computer screens.

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In addition to these societal and environmental differences in children's lives, recent research in the area of brain development and learning prompts a reexamination of beliefs and practices related to childrearing, teaching and learning. This article provides key information from this research and explores the implications for Even Start programs.

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What do we know?

Brain development occurs through an interplay between nature and nurture.

Ideas about why we are the way we are have changed radically over the years. The old belief that one's potential is based entirely upon one's genetic inheritance and is set at birth has evolved into a belief that, given the right environment, children can be successful regardless of their parents' IQ or achievement. Currently, both of these assumptions are being challenged as neuroscientists discover the constant interaction between specific environmental influences and the intricate circuitry of the brain.

The first three years of life are critical to a child's brain development. Billions of brain cells are formed in the first months of fetal life. Neurobiologist Peter Huttenlocher (1984) of the University of Chicago describes the process of measuring brain growth during fetal development as "counting snowflakes in a blizzard or drops of water in a torrential rainstorm." At its peak, the embryo is generating brain cells at a rate of 250,000 a minute.

Learning occurs through connections among brain cells. A single brain cell can connect with as many as 15,000 other cells. Between birth and eight months of age, the number of connections increases from about 50 trillion to 1,000 trillion. This overproduction ensures that the brain can adapt to any environment in which the child lives. The connections that are reinforced remain while others disappear. As a result, the biological brain of a one-year-old more closely resembles an adult's brain than that of a newborn. In fact, neurobiologist Harry Chugani (1997) of Wayne State University says the experiences of the first year are capable of completely changing the way a person turns out.

The connections among brain cells are called *synapses*, and they link up to form neural pathways or "learning maps." Experience creates these learning maps. It is during the first three years of life that most synapses are produced. The number of synapses increases until about age three, and then holds steady through about age ten. After age ten, synapses that are not used often are eliminated. Experiences that are repeated often—whether positive or negative—have a great impact on how the brain is wired. Repeated, daily actions and interactions have the most potential for affecting a child's life. In terms of developing literacy skills, nothing is more important for young children than regular, daily experiences of face-to-face interactions—being read to, talked to, listened to, touched and comforted. It may seem odd to a parent that simply describing what she is doing aloud to her baby as she dresses him is linked to his literacy development, but it is true. Teaching parents about the effect of repeated, positive interactions is key for helping parents understand how ordinary experiences become nourishing food for the child's brain.

While the human brain is remarkably resilient and adaptable, there are critical periods of time for certain types of learning.

During the early years of life, the child's brain is being customized to match his or her daily experiences. The nature of sensory experiences has a great impact on brain development and, subsequently, on behavior and learning. "Crawl time," or opportunities to safely explore the environment, for example, has links to school readiness by providing the physical experience of using one's body to learn about the properties of objects. The famous child psychologist Piaget linked this type of tactile experience to thinking and the development of thought processes. Yet, today, many children spend considerable time strapped into baby seats, swings or car seats, which restricts their movement and waking time for movement.

Visual experiences affect the development of the brain's visual pathways. Much of one's vision develops during the first year of life, with a major growth spurt at age two to four months. Exposure to a variety of stimulating input, including handling objects and learning about their shapes, colors, weights and movement, affects visual development. Many researchers warn against using television as visual stimulation. It is a poor substitute for direct experience and loving interaction, and may be too visually stressful for some young children.

During the first year of life, the auditory centers of the brain are stimulated by the repeated sounds children hear. Babies listen to words even though they cannot speak, and so it is important that adults talk with babies often using different vocabulary and inflection. This pre-verbal time is important for later language development, particularly the understanding of syntax, vocabulary and meaning. In an important longitudinal study of language development and learning, Hart and Risley (1995) carefully analyzed the language development of children from their first birthday up until age three. They discovered vast differences between children reared in poverty and those from working class and middle class families. The differences in language development were not rooted in the type of physical care the children received at home, but in the quantity and variety of language to which they were exposed. By the time the children were three, many children of the more affluent families had larger vocabularies than the parents of the higher poverty families. Reading to children even before they speak is one way to expose children to a wider variety of words than they might hear in typical interactions at home. This strategy is also helpful for stimulating the auditory centers of the brain and making neural connections between reading and pleasure. Children who know and use a wide range of words by age five are likely to be better readers.

Although not directly related to brain development, a common risk factor during this critical window of language learning is ear infections. In order to learn language children must hear well, so repeated ear infections may interfere with speech and language. It is important for parents to follow up with physicians after medical treatment for ear infections, and to learn informal ways of assessing children's hearing.

Negative experiences and the absence of appropriate stimulation are more likely to have serious and sustained effects during infancy than at later ages.

Early in pregnancy, the brain's cortex is formed. Exposure to drugs, chemicals, radiation and stress can affect its growth and, consequently, affect the child's later thinking functions. Research on the vulnerability of the developing brain to environmental factors shows that substances such as nicotine, alcohol and cocaine may have more harmful and long-lasting effects on children's development than previously thought.

The nature of children's attachment to their primary caregivers also affects brain development. Researchers already know about the importance of secure attachments to later cognitive and emotional development. Now they are seeing the effects of maternal depression on the child's capacity to regulate emotion and seek out stimulation. The period between six and eighteen months is a time for stabilizing attachment and emotional regulation. Depressed mothers have difficulty providing optimal levels of stimulation and positive emotional interactions. When observing depressed mothers with their babies compared to non-depressed mothers, researchers find there is more negative affect in both mother and child, more inattentive behavior by mothers, and more averting contact by babies. Since depressed mothers talk to and look at their children less than non-depressed mothers, their babies also display a lack of responsiveness that "mimics" their mothers' behavior. When this type of inattentiveness by mothers continues, babies learn that their responses do not matter. Consequently, they have high degrees of anxiety, which they may try to alleviate through "self-soothing" rather than reaching out to others.

If maternal depression persists throughout the first twelve to fourteen months of a child's life, it is predictive of a child's behavioral problems and lower cognitive ability during the preschool years. In fact, depression is predictive of these problems for a child of four regardless of the mother's depression status when the child reaches four (in other words, even though the mother may no longer suffer from depression at that time). The positive side to this research is that when maternal depression is recognized and treated by the time a child is six months old, there are no lasting effects.

How children are cared for has a decisive, long-lasting impact on their development, their ability to learn, and their capacity to regulate their own emotions.

The quality of attachment in the first year of life between children and their primary caregivers is linked to social competence and emotional well being and, therefore, school success. Harold Rubenstein (1998) from Dartmouth Medical School suggests that troubled early relationships cause the child's brain to consume glucose to deal with stress—glucose that otherwise could be used for cognitive activity. Early and repeated exposure to stress or violence can also cause the brain to reorganize so as to increase receptor sites for alertness to chemicals (Kotulak, 1996) which, in turn, is linked to impulsivity and aggression.

When children's distress is handled consistently with prompt, warm attention, they are more likely to form secure attachments to their primary caregivers. They also will develop the neural connections that help them to eventually self-regulate when faced with strong emotions or discomfort. Some children are temperamentally highly sensitive and will always be more reactive to sounds, sights, smells and other experiences than less sensitive children. Responsive caregivers can teach these children how to recover and calm themselves when bombarded by stimuli. Highly sensitive children without such responsive caregivers have a difficult time recovering from distress. Classrooms for children with behavioral impairments are full of such children. It is hard for a child to attend to even the most enriched language experiences in an early childhood education program when the child's energy is needed to cope with regulating the stress in his or her body. Stress and fear produce a chemical in the brain that can destroy brain cells. Parents may not be able to change stressful situations in their lives, but they can learn how to manage their reactions to stress while interacting with their children.

Discipline and guidance for toddlers and prekindergarten children are popular topics in parenting education programs. Infants do not require the same kind of guidance strategies, so this topic is often not addressed for parents of the youngest children. However, babies respond to the emotional states of their caregivers. If a caregiver is angry or frustrated while interacting with a baby, even if the anger is directed at another person, it can affect the baby's emotional state and developing brain. If a caregiver loses control and shakes a baby, permanent brain injury or even death may result. Parenting education addressing discipline, guidance, and stress management cannot begin too early.

Prevention and early intervention are among our most powerful tools for improving children's lives.

Early intervention cannot wait until children are born if we want all children to enter school ready to learn. Also, early intervention cannot be the responsibility of any single program or discipline. Parenting education, prenatal care, substance abuse prevention, smoking cessation, depression screening, well-child programs, quality childcare options, and family support must all work together to support families in raising healthy children.

The efficacy of early intervention has been demonstrated across the country with all types of families. Importantly, the impact of such efforts has proven to be long-lasting, especially when support continues or is followed up once children enter school.

Implications for Even Start

Use parenting education as the vehicle for strengthening parent-child attachment.

The primary developmental task of infancy is to develop a strong and trusting attachment to one's primary caretaker. Through secure attachments, infants learn the rhythmical, reciprocal exchanges between child and adult that form the basis for all later communication. Some babies are biologically more predisposed to forming secure attachments than others. Highly sensitive or premature babies who are difficult to comfort present greater challenges to their parents and caretakers. A proven way to support secure attachments between parents and infants is to help parents learn to "read" the nonverbal signals babies give. PACT time may involve such "reading exercises" as differentiating a baby's cries, recognizing a desire to play and be stimulated, and recognizing when a baby has had enough or too much stimulation. Simply spending time together does not necessarily increase a parent's understanding of his or her baby. Many parents, particularly first-time parents, need to learn what to look for when interacting with their babies. In addition to center-based PACT time, home visits provide an opportunity for Even Start staff to individualize attention and instruction for each family.

Parents can strengthen their parenting and literacy skills through group experiences as well as through individual instruction. One key to parenting education is the development of observation skills. The better parents are at identifying the signals and responses children give when presented with different experiences, the better they will be able to apply principles of child development to the parenting of their children. Observation skills taught in a group are a good way to raise and maintain curiosity about differences among babies, and to encourage parents to learn from each other as well as from their own babies. The modeling of responsive caregiving is important for parents to observe, but too subtle to be the main vehicle for conveying information. Even Start staff responsible for parenting education and PACT time need to be skilled observers themselves, noticing the breaks in rhythm between parents and children, and structuring opportunities for practice and feedback of new approaches to interaction.

Use parenting education as the vehicle for developing children's literacy skills.

Programs that have systematically provided instruction to parents on literacy activities have had positive effects on parents' skills in reading to their children. Reading to children is consistently linked to positive literacy outcomes for children. Other parent-led literacy activities are also beneficial for children as they move beyond infancy into toddlerhood and preschool development. Reading books, telling personal stories to and discussing stories with children provide opportunities to practice predicting, sequencing, higher-order questioning, and drawing moral inferences from stories. Reading and storytelling time also enables parents to create a controlled and predictable activity for children, involve siblings and other family members, share their own childhood experiences, and teach "life lessons" to their children. When parents learn new approaches for using language to clarify expectations, set limits and discuss conflicts, they will have alternatives to physical punishment and yelling at children to manage behavior.

In the context of controlled literacy activities, other issues of child development and parent-child relationships can be addressed. PACT time can be used to increase parents' awareness of and practice with their children's language development. Language is best learned through regular conversation between caregivers and children beginning at birth. For parents who are unaccustomed to frequent and complex verbal interactions with their children, modeling, coaching and mentoring by parent-educators is extremely important.

Provide opportunities for staff training and development in order to provide and maintain high-quality services.

The widespread dissemination of brain research is relatively recent. Findings are slowly making their way into teacher training courses, but for those who were trained years ago or those without formal training, this research and its implications for early childhood education and care are new information. Educators with training and experience working primarily with prekindergarten-aged children need to learn new skills and approaches for working with infants and toddlers, because the strategies, activities and assumptions about learning are different. Because the cognitive development and learning acquired in infancy have a tremendous impact on later literacy, young children will benefit greatly from staff and caregivers who are well trained in early childhood education.

6 Because maternal depression can have such inhibiting effects on children's early development, Even Start staff need to recognize the signs of depression. Just as staff need to be aware of child abuse symptoms to identify risk situations, staff who identify signs of maternal depression can intervene and make referrals to appropriate agencies. Staff training should include information on how to recognize the signs of depression in parents and children, and programs should establish a referral network for follow-up screening and treatment.

The licensing requirements for infant and toddler care make it more expensive to provide because of the lower adult:child ratio. Many programs employ paraprofessionals as caregivers for infants as a cost-saving strategy. For such programs, regular staff training and supervision can enhance the quality of services for young children. Not only is it critical that staff who care for infants and toddlers provide the highest quality services and learning environment that they can, but they must also be skilled in building strong partnerships with parents, because parents play a critical role in supporting the development and learning of children at home. Staff need to convey to parents that a rich language environment coupled with responsive physical care supports healthy attachment between parents and children.

Some programs employ community-based childcare providers to deliver services to infants and toddlers while their parents participate in other Even Start activities. Even Start staff who place young children in other settings should screen those programs for appropriateness, and could also enhance those services by inviting the providers to participate in Even Start staff development activities. Collaborations between Even Start staff and childcare providers probably already exist, but these collaborations can be strengthened by sharing information and training opportunities.

Intensive and sustained services are necessary to create real change and have a lasting impact on families. It is also true that changing parents' attitudes and beliefs about parenting is difficult and takes time; it cannot be accomplished during the limited PACT time available in most Even Start programs. However, the integration of program components can intensify the effect of services because the big messages about parenting, language and learning are reinforced. A commitment to staff development and program planning will help staff from all four Even Start components to use common methods with parents, to focus simultaneously on similar topics and themes, and to share observations, reflections and plans.

In summary, the increasing public awareness of how early brain development affects children's learning is creating new levels of enthusiasm and support for high-quality infant and toddler care. One of the effects of welfare reform is that there are greater numbers of infants and toddlers requiring care because their parents are working. These children, who are predominantly from disadvantaged backgrounds, deserve settings that will adequately stimulate their senses and support their close attachments to parents with whom they may spend little time. Through their intergenerational programs, Even Start practitioners have a unique opportunity to have a positive effect on improving the literacy, lives and futures of many families.

Endnotes

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Dodge, D.T. & Heroman, C. (1999). Building Your Baby's Brain: A Parent's Guide to the First Five Years. Washington, D.C.: Teaching Strategies. Web site: www.TeachingStrategies.com.

This booklet for parents summarizes scientific findings and gives suggestions for ways parents can support their young children's brain development and learning across a range of dimensions. (This project was supported by the U.S. Department of Education's Even Start Family Literacy Program in the Office of Elementary and Secondary Education, and the National Institute on Early Childhood Development and Education in the Department's Office of Educational Research and Improvement.)

The National Association for the Education of Young Children (NAEYC), 1509 16th Street, NW, Washington, D.C. 20036-1426, Phone (800) 424-2460 or (202) 232-8777, E-mail: naeyc@naeyc.org, Web site: www.naeyc.org.

NAEYC's Web site has good information and resources and a catalog of publications (pubaff@naeyc.org). Of particular interest may be Early Years Are Learning Years, a biweekly series of articles. A good program administration resource is NAEYC's Guide to Accreditation and Accreditation Criteria and Procedures, 1998 edition.

Shore, R. (1997). Rethinking the Brain: New Insights into Early Development. New York: Families and Work Institute.

This book, based on presentations from the conference "Brain Development in Young Children: New Frontiers for Research, Policy, and Practice," summarizes the research from neuroscience and child development, and points to policy recommendations and suggestions for best practice. This book may be too technical for many parents, but can serve as background for staff for their own learning and for developing newsletters and trainings for parents.

WestEd, Phone (415) 565-3000, Web site: www.wested.org.

WestEd is a nonprofit agency that conducts research and provides educational services. It is one of the U.S. Department of Education's educational laboratories administered by the Office of Educational Research and Improvement. Its Web site has good information and resources and a catalog of publications. Of particular interest may be WestEd's Program for Infant/Toddler Caregivers (PICT), which has a series of videos and supporting materials, including curriculum guides and trainer's manuals. For more information, visit the Web site: www.pitc.org or call (800) 995-4099.

Zero To Three: National Center for Infants, Toddlers and Families, 734 15th Street, NW, Suite 1000, Washington, D.C. 20005, Phone (202) 638-1144, Web site: www.zerotothree.org.

Zero To Three is a nonprofit organization whose work focuses on child development during the first three years. Zero To Three provides information for parents as well as professionals, and its Web site has online resources and a list of publications.

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